For Reference

THE UNIVERSITY OF ALBERTA

ARE THE GRADE XI STUDENTS
IN EDMONTON MAKING VOCATIONAL
PLANS IN LINE WITH THEIR MENTAL ABILITY?

A DISSERTATION
SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION

FACULTY OF EDUCATION

BY

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The undersigned hereby certify that they
have read and recommend to the School of Graduate
Studies for acceptance, a thesis entitled "Are the
Grade XI Students in Edmonton Making Vocational
Plans in Line With Their Mental Ability?" submitted
by Benno Gerry Fricke, B.A.; B.Ed., in partial
fulfilment of the requirements for the degree of
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CHAPTER I

PURPOSE OF THE INVESTIGATION

The second of five basic principles stated in
the Alberta Program of Studies for the Senior High
School is that "The high school is expected to pro-
vide 'guidance' for every pupil, not as a 'subject'
but as a personal service. Students should have the
opportunity to assess their strengths and weaknesses
and should be encouraged to make a realistic apprai-
sal of themselves so that the choice of an occupa-
tional goal will be in line with their abilities."[1]

Of the various abilities that may be involved
in the choice of a career, one of the most important
is mental ability. Because of the importance of in-
tellectual capacity which ought to condition all
choices of career it is considered proper to concen-
trate in this investigation on it alone.

Consequently the major aim of this study is
to determine whether present education and guidance
practices in Edmonton lead students to make occupa-
tional choices and plans in line with their mental
ability.

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[1] Department of Education, "Program of Studies for
Senior High School, Regulations 1950", p.7.

Mental hygienists emphasize the need of facing reality squarely. Carrol says, "In school and in college intellectual limitations are rarely faced honestly by either student or teacher. It is important for an individual's mental health that he know approximately what his mental level is. If it is relatively low, that is a condition to which he must adjust.[1] In the next chapter of the same book he goes on to say: "Many behavior disorders could have been prevented if the individuals now suffering from them could have accepted and worked within their limitations."[2] Goals which are seriously sought should always be attainable. Success for the individual is often defined in terms of the goals which he has set for himself. It is obvious then that each student should have a clear understanding of the nature and extent of his abilities and adjust his goals accordingly.

For purposes of this investigation, mental ability will be evaluated through the use of general intelligence or scholastic aptitude tests. Williamson, in his book "How to Counsel Students", says "regarding the use of the general intelligence tests to predict success in an occupation, Fryer and Sparling conclude that with the possible exception of a tryout in the

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[1] Carrol, H. A. "Mental Hygiene" Prentice-Hall, Inc. New York, 1947. p. 14.

[2] Ibid. p. 23.

occupation itself, general tests of intelligence are
by far the best single predictive measure of success
in an occupation."[1]

Answers to the following questions are some of
the secondary objectives of the investigation. What
portion of the students have made occupational choices?
How many different occupations have the students chosen
and how frequently is each occupation chosen? Do stu-
dents with occupational choices differ in mental ability
or sex from students without occupational choices? Are
there real differences in the mental abilities of the
students selecting different occupations? Is there any
correlation between the student's mental ability and the
occupational level chosen? Is there a significant dif-
ference between the mean mental ability of the students
choosing an occupation and the mean mental ability of
persons found in that occupation? Do the gifted stu-
dents make better choices than those who are not so
intelligent? Do girls make better choices than boys?
Of the students without occupational choices, what
percent indicate that they have not seriously consi-
dered making an occupational choice? What portion of
the students expect to complete Grade XII before
leaving High School?

[1] Williamson, E. G., "How to Counsel Students",
McGraw-Hill Book Company Inc., New York, 1939,
p. 453.

Now that the major aims of the study have been introduced attention will be focused in the next chapter, on the special problem of the study and the method of the investigation.

CHAPTER II

THE PROBLEM AND METHOD OF THE INVESTIGATION

It is difficult to say when a student has made
an occupational choice in line with his mental ability.
Germane, in speaking of the value of intelligence test
scores in placing a student in a suitable occupation,
states that "it is a well established fact that one's
success in certain kinds of work is contingent upon
one's having a definite amount of scholastic ability."[1]

Upper and lower critical limits have been es-
tablished for a number of occupations. A person may
be too bright for a given job, just as he may be too
dull. Ghiselli in discussing the lower critical
limit says, "The minimum intellectual requirements
for most jobs, at least as measured by intelligence
tests, are very low indeed. Since the proportion
of people in the general population falling below
these minimum levels is very small such requirements
would seem to be quite an unimportant problem in
vocational guidance."[2] With regard to the upper

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[1] Germane, E. G. and Germane, C. E., "Students Personnel
Work in High School", Silver Burdett Company, New
York, 1941. p. 385.

[2] Ghiselli, E. E., "Use of Intelligence Tests in Voca-
tional Guidance", in Encyclopedia of Vocational Gui-
dance, Vol. 1. Edited by Kaplan, O. J., Philosophical
Library, New York, 1948. p. 586.

limit he says whether due to boredom or other causes
"the fact remains that the high scoring individual
is not a good risk for a lower job since he cannot
successfully keep at it. The notion that he is too
good for such work helps not a whit -- the fact re-
mains that he does not have the capacity to do the
job.

"It is apparent from the foregoing discussion
that an individual's intelligence test score does give
some information relative to his optimal occupational
group. It is likely that with jobs above or below his
intellectual level the probability of success is
smaller."[1]

Burt, in a chapter on Intelligence and Voca-
tional Aptitude, considers the occupational hierarchy
according to intelligence, and says the theory under-
lying it is "that a person will in the long run tend
to rise about as high in the occupational scale as
his intelligence warrants. If he attempts a job too
high in the scale, he will find it too exacting and
leave either voluntarily or involuntarily. If, on
the other hand, he starts with one that is too low
in the scale, he will not find it sufficiently in-

[1] Ghiselli, E.E., "Use of Intelligence Tests in Voca-
tional Guidance", in Encyclopedia of Vocational
Guidance, vol. 1. Edited by Kaplan, O. J., Philo-
sophical Library, New York. 1948. p. 587.

teresting because it does not afford an adequate
outlet for his intellectual ability, and he will
leave it for something higher. The result is that
he ultimately lands at about the maximum level at
which he can do effective work. Other factors, of
course, sometimes alter the results. A lazy indi-
vidual may not want a more exacting type of work,
or a person unattractive in appearance or with some
personality defect may be refused a job for which
he is capable. The above assumption deals only with
the average case. If it is valid, we may conclude
that the average intelligence of an occupational
group indicates approximately the degree of intel-
ligence that is necessary for effective work in
that occupation."[1]

In the "Examiner Manual for the Army Classi-
fication Test" it is stated that " a person who
scores significantly lower than the workers in a
certain occupation should probably be guided away
from it and from the higher level jobs. One who
scores higher than workers in a certain occupation
may well select a job better suited to his intel-
lectual capacities. The individual whose AGCT score

[1] Burt, H.E., "Principles of Employment Psychology",
Harper and Brothers. New York, 1942. p. 296.

is average or slightly above average for a given

occupation should have the greatest chance for

success in the job."[1]

In the light of the above there seems to be

adequate justification for treating the average in-

telligence of workers in an occupation as the intel-

ligence desirable for students selecting that occu-

pation. The method used in this study to determine

whether a student is making an appropriate choice

is to compare his mental ability with the mean men-

tal ability of persons actually engaged in the work

the student has chosen to follow.

The occupations have been arbitrarily classi-

fied(according to the average mental ability found in

each occupation), into the following eight categories

or levels.[2]

```
(1)  122 and above
(2)  117  -  121
(3)  112  -  116
(4)  107  -  111
(5)  102  -  106
(6)   97  -  101
(7)   92  -   96
(8)   91 and below.
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The Harrells have reported critical ratios

[1] "Examiner Manual for the Army General Classifica-
tion Test." Science Research Associates, Chicago,
1947.

[2] Mean mental abilities were taken from the S. R. A.
Job Chart.

between the mean mental abilities of 74 occupations and although as would be expected, they are not all significantly different from each other, the occupations at the midpoint of each of the eight levels are significantly different from each other. From more recent data on 227 occupations reported by Stewart, comparable critical ratios may be calculated providing additional significant differences between the mental abilities of other occupations.

The mental abilities of the student have also been arbitrarily classified into eight levels with the same class boundaries.

Through the use of the resulting two distributions, one of the actual mental abilities of the students, and the other of the average mental abilities found in the occupations which the students have chosen, it is possible to derive some interesting facts. It is possible to calculate the product-moment coefficient of correlation showing the relationship between the student's mental ability and the occupational level to which the student has aspirations. The means of each distribution may be obtained and a test of mean differences between the average mental ability of the students and the average mental ability found in the occupations which the students have selected. Similarly the standard deviations may be tested to detect any real differences

in variability which exist in the two distributions.

And perhaps most important of all it would be possible to see the number and degree of discrepancies which exist between the students' mental ability level and the mental ability level found in the occupations selected by the students. Through the use of the eight point classification and the preceding statistical procedures and techniques, a number of the questions posed in the first chapter will be answered.

The vocational plans of the Grade XI students were revealed through the use of a questionnaire. Randomization was not necessary because the entire Grade XI population in the Edmonton Public High Schools were to be involved. Students who were taking some subjects in Grade XII were not considered. The Grade XI homeroom teachers passed out 620 questionnaires to their students, 546 were returned, but since no intelligence test scores were available for nine students this investigation deals with the remaining 537 students.

The questionnaire was worded so the student's response would indicate a definite plan and intention to enter the occupation rather than a mere preference for an occupation. While every choice may be considered a preference, students may have an occupational preference without planning to become engaged in this occupation. Students without plans were given an opportunity

to express their preferences by indicating the occupations which they had considered as possible future vocations. In this investigation the primary concern is with those students who have indicated definite occupational plans.

Results of all intelligence tests given to the students were taken from the cumulative record folders at each high school. The mental ability of the students was taken as the mean of the intelligence test scores.

It is this average which fixes the student's mental ability level in the eight level classification.

The next chapter will be devoted to a more complete description of the sources of data and materials, the most important of which were mentioned in the preceding pages.

CHAPTER III

SOURCES OF DATA AND MATERIALS USED

Information for this investigation was obtained
from a questionnaire answered by Grade XI students, from
several classifications of occupations according to
intelligence, and from results of intelligence tests given
to the student.

The following questionnaire was completed by 537
Grade XI students from six Edmonton High Schools. Space
will not permit the exact presentation of the questionnaire
as it was originally given to the students.

QUESTIONNAIRE ON VOCATIONAL PLANS

Name .... Male or Female ....

Age .... Grade .... School ....

Teacher ....

Occupation of father or person supporting you ....

....

1. What grade do you expect to complete before leaving
    high school? Grade 11   12 (circle your answer)

2. Have you decided what you plan to do for a living,
    that is, have you made an occupational choice? Yes No

3. If you have answered "No" go on to questions 6, 7,
    and 8.

4. If you have answered "Yes" indicate the occupation
    you expect to make a lifetime work by circling it in

the following list. If the occupation you hope to
follow is not included here state your choice in the
space provided at the end of the list.

Accountant
Acetylene Welder
Animation Artist
Artist
Athletic Instructor
Auditor
Automotive Electrician
Automobile Serviceman
Baker
Band Leader
Barber
Blacksmith
Boilermaker
Bookkeeper, General
Bookkeeping Machine
        Operator
Bricklayer
Cabinet Maker
Carpenter, General
Cashier
Chauffeur
Chemical Laboratory Aid
Chemist
Clerk, Chief
Clerk, File
Clerk, General
Clerk, Postal
Clerk, Sales
Clerk, Shipping
Clerk, Shop
Clerk, Stock
Clerk, Typist
Combination Welder
Concrete Mixer Operator
Construction Machine
        Operator
Cook
Crane Operator
Dental Laboratory
        Technician
Dentist

Draftsman
Driver, Truck
Electrician
Embalmer
Engine Lathe Operator
Engineer, Architectural
Engineer, Civil
Engineer, Consulting
Engineer, Chemical
Engineer, Locomotive
Engineer, Mechanical
Engineer, Mining
Entertainer
Executive
Farmer
Fireman
Geologist
Home Economist
Hospital Orderly
Investigator
Laboratory Technician
Laundry Machine Operator
Lawyer
Lineman, Telephone and
        Telegraph
Linotype Operator
Lumber Jack
Machine Operator
Machinist
Meat Cutter
Meat or Dairy Inspector
Mechanic, Airplane
Mechanic, Automotive
Mechanic, Construction
        Equipment
Mechanic, Diesal
Mechanic, Railway
Mechanic, Refrigeration
Millwright
Miner
Motion Picture Projectionist

Musician, Instrumental
Nurse, Bachelor of Science
Nurse, Registered
Nurse, Practical
Office Machine Repairman
Painter, General
Painter, Sign
Personnel Officer
Pharmacist
Photographer
Photographer, Aerial
Physician
Professor
Pipe Fitter
Policeman
Printer
Production Manager
Public Relations Man
Purchasing Agent
Radio Repairman
Railway brakeman
Railway Sectionman
Railway Switchman
Reporter

Salesman
Sales Manager
Scientist
Sewing Machine Operator
Sheet Metal Worker
Shoe Repairman
Statistician
Social Worker
Stenographer
Steward
Store Manager
Supplies Packer
Surveyor
Tailor
Teacher
Teletype Operator
Tool Maker
Typist
Veterinarian
Warehouseman
Watch Repairman
Welder
Writer

Other ....

5. In a few words describe, if you can:

(a) the kind of work you expect to do in this

occupation ....

....

(b) the kind and length of training, if any, that

is necessary for this work ....

....

QUESTIONS 6, 7, and 8 ARE FOR THOSE WHO ANSWERED NO
IN QUESTION 2.

6. When you leave high school do you expect to take

further education or training? Yes. No. Undecided.

7. Have you been thinking about making an occupational

choice? ....

8.   If "Yes" what occupations have you considered? ....

....

....

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The "Examiner Manual for the SRA Verbal and Non

Verbal Forms" contains a job chart for 150 occupations.

From this job chart can be read the average percentile

rank for each occupation. With the aid of the conversion

table also given in the manual these average percentile

ranks can be changed to average intelligence quotients.

The SRA job chart provided the basis for locating the

different occupations in one of the eight mental

ability levels as outlined in the previous chapter.

In a study carried out by Naomi Stewart, and

reported in "Occupations, the Vocational Guidance

Journal", 227 occupations are listed in descending order

of median Army General Classification Test Scores. This

study is based on a much larger mass of statistics

gathered during World War II than the oft-quoted report

by R. M. Yerkes on "Psychological Examining in the

United States Army" during World War I. The number of

men involved in the latter investigation was only

18,423, and covered 68 occupational groups, the study

by Stewart "gives results for 81,553 white enlisted

men in 227 occupations. The study in its entirety

required the processing and analysis of various kinds
of data for more than 250,000 cases."[1]

A similar study by the Harrells reported in
"Educational and Psychological Measurement" on "the
AGCT scores of 18,782 white enlisted men of the Army
Air Forces Air Service Command distributed according
to their previous civilian occupations. Means and
medians and standard deviations are reported for 74
occupations for which there were samples of sufficient
size to be of significance."[2]

While it is possible that there may be some
variation in the mental abilities of Canadian and
American persons in a particular occupation, no investi-
gation known to the writer has shown a significant
difference to exist. Since a survey has yet to be made
in Canada on the mental abilities of persons engaged
in the various occupations it is necessary to use the
classifications made on American workers.

Scores from all intelligence tests taken by the
students during their entire school career were used to
arrive at their mental ability levels. The results of
nine different groups of intelligence tests were available.

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[1] Stewart, N., "AGCT Scores of Army Personnel Grouped
by Occupation", "Occupations, the Vocational Guidance
Journal", October 1947 p.5.

[2] Harrell, T. W., and Harrell, M. S., "Army General
Classification Test Scores for Civilian Occupations"
Educational and Psychological Measurement, Vol. 5,
No. 3, 1945.

However, in no case was it possible to have nine intelligence test scores on one student. In a few cases, six scores were averaged to fix the student's mental ability level. In other cases it was necessary to use only one score. The Laycock Mental Ability Test provided the greatest number of test results. Scores from 459 students were available for this test. The other tests and number of scores for each were: The Otis Quick Scoring Mental Ability Tests, Gamma forms (424); The Detroit First Grade Intelligence Test 206; The Willis-Smith Advanced Mental Tests (146); The Otis Self-Administering Tests of Mental Ability (65); The Henmon-Nelson Test of Mental Ability (43); The Terman Group Test of Mental Ability (37); The Revised Stanford Binet Scale (14); The Wechsler-Bellevue Intelligence Scale (7).

A total of 1451 or a mean of 2.9 intelligence test results were used to determine the mental ability level for the 537 Grade XI students.

The remainder of the thesis will be a presentation of the findings of the investigation.

CHAPTER IV

EXAMINATION OF QUESTIONNAIRE RESPONSES

In this chapter the responses of the students
will be described without reference to the mental
ability of the students making them. Special attention
will be given to the answers of the boys and girls
separately.

The questionnaire was submitted to 620 Grade
XI students, the responses of 537 of these are under
consideration in this study. Since selective factors
do not seem to be operating, it may be assumed with
considerable confidence that the findings present a
valid picture of the occupational plans of the Grade XI
students in the Edmonton Public High Schools.

The following table shows the students' answers
to questions concerning the grade they expect to
complete, whether they have made an occupational choice,
and decisions as to further education and training.

A number of observations and findings from the
following data deserve particular mention. Almost
three fifths of the Grade XI students have made
occupational choices. Only 47.37 per cent of the boys
compared to 69.84% of the girls have choices. This
difference of 22.47% is significant at the .01 level.
(See Appendix, page 58) That is a difference of
this size could occur in less than 1% of the cases due
to sampling errors. It may therefore be concluded that

TABLE I

STUDENTS' DECISIONS ABOUT THEIR VOCATIONAL AND EDUCATIONAL FUTURE

Group Under Consideration	Both Sexes	Boys	Girls
I. Total students involved	537	285	252
II. Students with choices	311	135	176
A. Expect to complete Grade XII	253	108	145
B. Expect to complete Grade XI only	58	27	31
III. Students without choices,	226	150	76
A. Who expect to complete Grade XII	205	141	64
(a) Plan on further education or training	94	55	39
(i) Have been thinking about making a choice	84	46	38
(ii) Have not been thinking about making a choice	10	9	1
(b) Are undecided about further education or training	91	69	22
(i) Have been thinking about making a choice	72	54	18
(ii) Have not been thinking about making a choice	19	15	4
(c) Do not plan on further education or training	20	17	3
(i) Have been thinking about making a choice	12	10	2
(ii) Have not been thinking about making a choice	8	7	1

TABLE I (Cont'd)

Group Under Consideration	Both Sexes	Boys	Girls
B. Who Expect to complete Grade XI only	21	9	12
(a) Plan on further education or training	4	1	3
(i) Have been thinking about making a choice	4	1	3
(ii) Have not been thinking about making a choice	0	0	0
(b) Are undecided about taking further education or training	13	7	6
(i) Have been thinking about making a choice	9	4	5
(ii) Have not been thinking about making a choice	4	3	1
(c) Do not plan on taking further education or training	4	1	3
(i) Have been thinking about making a choice	3	0	3
(ii) Have not been thinking about making a choice	1	1	0

more girls in Grade XI have occupational choices than boys.

Because 94% (141/150) of the boys without occupational choices expect to complete Grade XII before leaving high school perhaps it is not so urgent that they make occupational choices.

It is interesting to note that while 94% of the

boys without choices plan to complete Grade XII, only
80% (108/134) with choices expect to complete Grade XII
before leaving. This difference of 14% is significant
at the .01 level. It would seem that either some of the
boys about to leave school at the end of the present
school year were compelled to make an occupational
choice, or that they are going to leave school because
of their vocational plans.

No such difference in the girls is to be found
between the 83% (145/176) with occupational choices,
and the 84.2% (31/76) without occupational choices who
are expecting to complete Grade XII before they leave
high school.

It can be seen from the table that the boys
are not as concerned as the girls about vocational
decisions. Of the boys without occupational choices,
23.4% indicated that they had not been thinking about
making an occupational choice. Only 10.5% of the girls
without occupational choices indicated that they had
not been thinking about making an occupational choice.
This difference of 12.9% is significant at the .05 level.

Since the questionnaire was completed three
weeks before the end of the school year, it is
surprising to see that 21 students expecting to complete
Grade XI only, had not made an occupational choice.

This study is mainly concerned with the students

TABLE II

OCCUPATIONS AND FREQUENCY CHOSEN

Occupation	TOTAL	Boys	Girls
Accountant	5	5	
Acturarian	1	1	
Book Binder	1	1	
Bookkeeping Machine Operator	1		1
Bookkeeper, General	3		3
Cabinet Maker	3	3	
Carpenter	1	1	
Chemist	2		2
Clerk, File	3	1	2
Clerk, General	3		3
Clerk, Typist	8		8
Comptometer Operator	4		4
Commercial Artist	2	1	1
Contractor	1	1	
Cook	1	1	
Costmetologist	4		4
Dental Laboratory Technician	1		1
Dentist	4	4	
Dietitian	4		4
Draftsman	1	1	
Dress Designer	1		1
Electrician	6	6	
Engineer, Aeronautical	1	1	
Engineer, Architectural	2	2	
Engineer, Chemical	2	2	
Engineer, Civil	3	3	
Engineer, Electrical	1	1	
Engineer, Locomotive	1	1	
Engineer, Mechanical	2	2	
Engineer, Petroleum	7	7	
Entertainer	1	1	
Farmer	5	5	
Fireman	1	1	
Foreign Missionary	1		1
Forester	2	2	
Geologist	3	3	
Home Economist	1		1
Interior Decorator	1	1	
Laboratory Technician	2		2
Lawyer	11	11	
Machinist	4	4	
Meat Inspector	1	1	
Mechanic	2	2	
Mechanic, Aeroplane	3	3	

TABLE II (Cont'd)

Occupation	TOTAL	Boys	Girls
Mechanic, Auto	4	4	
Mechanic, Diesel	2	2	
Millwright	1	1	
Motion Picture Projectionist	1	1	
Musician	4		4
Nurse, Bachelor of Science	8		8
Nurse, Practical	1		1
Nurse, Registered	37		37
Occupational Therapist	1		1
Optometrist	1		1
Painter, Sign	2	2	
Pharmacist	6	5	1
Photographer	1	1	
Pilot	2	2	
Physician	15	10	5
Pipe Fitter	2	2	
Plumber	1	1	
Policeman	4	4	
Radio Repairman	3	3	
Radio Technician	1	1	
Reporter	4	3	1
Salesman	4	4	
Scientist	4	3	1
Secretary	1		1
Sheet Metal Worker	1	1	
Social Worker	5		5
Stenographer	46		46
Teacher	17	2	15
Telephone Operator	2		2
Trucker	1		1
Veterinarian	1		1
Welder	1	1	
Welder, Acetylene	2	2	
Writer	2	1	1
X-ray Technician	6		6

having indicated an occupational choice, therefore
their responses will be treated more fully.

The students' occupational choice are listed
above in alphabetical order showing the frequency of
selection for each sex as well as for the total. A

few occupations are chosen by both boys and girls.

A total of 78 different occupations were chosen by the Grade XI students. The boys chose 53 and the girls 34 different occupations. Eight occupations were selected by both boys and girls. The eight most popular occupational groups contained 52 per cent of all choices. Over one-third (108) of the students expect to become engaged in occupations which normally require university education for entrance. More boys than girls selected such occupations, the per cent being 42.2 and 29.0 respectively.

The prime purpose for including item six on the training required and the nature of the work the student expected to do in the occupation chosen, was to ascertain exactly the occupational level of each student's choice. This was especially necessary because of the practical difficulties in presenting a complete list of occupations to the students. As would be expected, a variety of responses indicate the degree to which students are informed as to their chosen occupation. But since the major aim of this study is to assess how well the student knows himself in relation to the demands of the working world and how likely he is to enter and succeed in the chosen occupation, an intensive study of the individual student's responses is not necessary.

However a few general observations are worthy
of mention. The students knew much more about the
kind and length of training that was necessary for
admission to the occupation than they did about the
nature of the work they would do in the occupation
they had chosen. Less than 18 per cent of the
students could not say exactly how long they would
have to spend preparing to enter the occupation they
had chosen. Only 3 per cent could not describe the
nature of the training they would need to qualify for
the work they desired to do.

Fifteen per cent of the students could not,
or at least did not, attempt to describe the kind of
work they expected to do in the occupation they had
chosen.

The 226 students who had not made, but were
thinking about making an occupational choice,
indicated that they had been considering 73 different
occupations. A total of 500 occupations were under
consideration by these students. Some students were
considering only one occupation; others were con-
sidering as many as seven different occupations.
Approximately eighty per cent of the students were
considering at least one occupation which required
university education for entrance, and 45 per cent
of all occupations mentioned, required this kind of

preparation.

From this it may have been gathered that there
was little variability in the occupational levels
which the students were considering. While this is
generally true, 22 students were considering occupations
which differed in from three to seven levels from each
other, according to the eight level classification
outlined in the second chapter. It is very unlikely
that these students could succeed and be happy in
each of these occupations because of the extreme
differences which exist between the mental ability
of the student and the mental ability desirable for
the occupations the students were considering.

In this chapter the questionnaire responses
of the students have been described and to some extent
analyzed. Several significant differences between
students with and without occupational choices were
revealed. These differences were without reference
to the mental ability of the students.

CHAPTER V

MENTAL ABILITY OF STUDENTS WITH AND WITHOUT OCCUPATIONAL CHOICES

In this short chapter the mental ability of the students with and without occupational choices will be described and compared. Several tests of significance will be used to determine if any real difference exist.

TABLE III

MENTAL ABILITY OF ALL GRADE XI STUDENTS

		Mental Ability Levels		
Group	No.	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above	Mean	S.D.
With Choice	311	30	35	42	64	53	41	20	26	105.56	9.95
Without Choice	226	13	19	34	31	31	42	28	28	108.43	10.21

A mean test of significance indicates that this difference of 2.87 between the means could occur in less than 1 per cent of the cases due to sampling errors. Therefore it may be concluded with high confidence that the Grade XI students in the Edmonton schools without occupational choices have a higher mean mental ability than the students with occupational choices.

A variability test of significance indicates that this difference of .26 between the standard deviations could occur in sixty-six per cent of the cases due to sampling errors alone. Therefore it may

be concluded that there is no real difference in variability of mental ability in Grade XI students with and without occupational choices.

TABLE IV

MENTAL ABILITY OF THE GRADE XI BOYS

| Group | No. | \multicolumn{8}{c}{Mental Ability Levels} | Mean | S.D. |

Mental Ability Levels										
Group	No.	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above	Mean	S.D.
With Choice	135	18	12	21	25	27	10	8	14	105.04	10.45
Without Choice	150	6	13	25	23	20	26	16	21	108.50	10.00

A mean test of significance indicates that this difference of 3.46 between the means could occur in less than 1 percent of the cases due to sampling errors. Therefore it may be concluded with high confidence that the Grade XI boys without occupational choices have a higher mean mental ability than the boys with occupational choices.

A variability test of significance indicates that this difference of .45 between the standard deviations could occur in 66 percent of the cases due to sampling errors alone. Therefore it may be concluded that there is no real difference in variability of mental ability in Grade XI boys with and without occupational choices.

TABLE V

MENTAL ABILITY OF THE GRADE XI GIRLS

Mental Ability Levels											
Group	No.	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above	Mean	S.D.
With Choice	176	12	23	21	39	26	31	12	12	105.96	9.55
Without Choice	76	7	6	9	8	11	16	12	7	108.28	10.50

A mean test of significance indicates that this difference of 2.32 between the means could occur in 10.2 percent of the cases due to sampling errors alone. Therefore it may be concluded that there is no real difference in the mean mental abilities of Grade XI girls with and without occupational choices.

A variability test of significance indicates that this difference of .95 between the standard deviations could occur in 34.2 percent of the cases due to sampling errors alone. Therefore it may be concluded that there is no real difference in variability of mental ability in Grade XI girls, with and without occupational choices.

CHAPTER VI

THE MENTAL ABILITY OF STUDENTS
SELECTING DIFFERENT OCCUPATIONS

Since the number of students selecting most of
the occupations is very small, the mental abilities of
the students selecting the 14 most popular occupations
will be considered in this chapter. Each occupation
selected at least five times will be presented. This
will be done for all students together and each sex
separately. While the size of the samples may detract
from the validity of some of the findings, the infer-
ences on the whole seem merited.

Each table presenting the mental ability of the
students for each group will be followed by another
table showing the statistical significance or non-
significance of the differences between the mean mental
ability of the students selecting the different occupa-
tions.

It can be seen from the following tables that
students selecting different occupations do differ in
mental ability. The differences between students selec-
ting some occupations are not statistically significant,
but the differences between others are so great that
factors other than sampling errors must be operating.

TABLE VI

THE MENTAL ABILITY OF GRADE XI STUDENTS SELECTING THE FOURTEEN MOST POPULAR OCCUPATIONS

Occupation	Number	Mental Ability of Students								Mean	S.D.	S.E.(M)
		91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above			
Stenographer	46	4	6	7	11	8	6	2	2	104.33	9.00	1.34
Registered Nurse	37	2	5	1	10	9	7	3	0	101.97	7.85	1.31
Engineering	18	1	0	2	3	4	1	4	3	111.50	9.60	2.31
Teacher	17	4	0	3	2	2	3	1	2	106.80	10.85	2.64
Physician	15	0	1	0	0	3	3	4	4	115.67	6.50	1.74
Lawyer	11	0	0	4	3	2	0	0	2	106.72	8.85	2.80
Nurse, B.Sc.	8	1	1	1	1	0	3	0	1	106.50	11.20	4.23
Clerk typist	8	1	2	1	4	0	0	0	0	99.00	5.60	2.11
Electrician	6	2	0	1	0	2	1	0	0	104.00	7.90	3.52
X-ray Technician	6	0	1	0	1	2	2	0	0	107.35	6.90	3.08
Pharmacist	6	1	0	0	2	1	1	0	1	107.35	10.70	4.78
Accountant	5	0	0	0	3	2	0	0	0	106.00	2.50	1.25
Farmer	5	1	0	2	1	1	0	0	0	100.00	6.65	3.33
Social Worker	5	0	1	0	1	1	2	0	0	107.00	7.45	3.73

TABLE VII

SIGNIFICANCE BETWEEN THE MEANS OF PAIRS OF FOURTEEN OCCUPATIONS CHOSEN BY ALL STUDENTS

Columns 1–14 correspond to the occupations listed in the first column.

Occupation	No.	Mean	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Stenographer	46	104.33		N	.01	N	.01	N	N	.05	N	N	N	N	N	N
2. Nurse, R.N.	37	101.97	N		.01	N	.01	N	N	N	N	N	N	.05	N	N
3. Engineer	18	111.50	.01	.01		N	N	N	N	.01	N	N	N	.05	.01	N
4. Teacher	17	106.80	N	N	N		.01	N	N	.05	N	N	N	N	N	N
5. Physician	15	115.67	.01	.01	N	.01		.01	N	.01	.01	.05	N	.01	.01	.05
6. Lawyer	11	106.72	N	N	N	N	.01		N	.05	N	N	N	N	.01	N
7. Nurse, B.Sc.	8	106.50	N	N	.01	N	N	N		N	N	N	N	N	N	N
8. Clerk, Typist	8	99.00	.05	N	N	.05	.01	.05	N		N	.05	N	N	N	N
9. Electrician	6	104.00	N	N	N	N	.01	N	N	N		N	N	N	N	N
10. X-ray Tech.	6	107.35	N	N	N	N	.05	N	N	.05	N		N	N	N	N
11. Pharmacist	6	107.35	N	.05	.05	N	N	N	N	N	N	N		N	N	N
12. Accountant	5	106.00	N	.05	.01	N	.01	N	N	.01	N	N	N		N	N
13. Farmer	5	100.00	N	N	N	N	.01	N	N	N	N	N	N	N		N
14. Social Worker	5	107.00	N	N	N	N	.05	N	N	N	N	N	N	N	N	

TABLE VIII

THE MENTAL ABILITY OF GRADE XI BOYS SELECTING THE SEVEN MOST
POPULAR OCCUPATIONS

Occupation	Number	Mental ability of Students								Mean	S.D.	S.E.(M)
		91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above			
Engineers	18	1	0	2	3	4	1	4	3	111.50	9.60	2.31
Lawyer	11	0	0	4	3	2	0	0	2	106.72	8.85	2.80
Physician	10	0	1	0	0	2	2	2	3	109.50	7.90	2.63
Electrician	6	2	0	1	0	2	1	0	0	104.00	7.90	3.52
Pharmacist	5	1	0	0	2	1	0	0	1	106.00	11.25	5.63
Accountant	5	0	0	0	3	2	0	0	0	106.00	2.50	1.25
Farmer	5	1	0	2	1	1	0	0	0	100.00	6.65	3.33

TABLE IX

SIGNIFICANCE BETWEEN THE MEANS OF PAIRS OF SEVEN
OCCUPATIONS CHOSEN BY THE BOYS

Occupation	No.	Mean	Engineer	Lawyer	Physician	Electrician	Pharmacist	Accountant	Farmer
1. Engineer	18	111.50		N	N	N	N	.01	.01
2. Lawyer	11	106.72	N		N	N	N	.01	N
3. Physician	10	109.50	N	N		N	N	.01	.05
4. Electrician	6	104.00	N	N	N		N	N	N
5. Pharmacist	5	106.00	N	N	N	N		N	N
6. Accountant	5	106.00	.05	N	N	N	N		N
7. Farmer	5	100.00	.01	N	.05	N	N	N	

TABLE X

THE MENTAL ABILITY OF GRADE XI GIRLS SELECTING THE EIGHT MOST
POPULAR OCCUPATIONS

Occupation	Number	Mental Ability of Students								Mean	S.D.	S.E.(M)
		91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above			
Stenographer	46	4	6	7	11	8	6	2	2	104.33	9.00	1.34
Registered Nurse	37	2	5	1	10	9	7	3	0	101.97	7.85	1.31
Teacher	15	2	0	2	2	2	4	1	2	108.35	10.70	2.86
Clerk, typist	8	1	2	1	4	0	0	0	0	99.00	5.60	2.11
Nursing, B.Sc.	8	1	1	1	1	0	3	0	1	106.50	11.20	4.23
X-ray Technician	6	0	1	0	1	2	2	0	0	107.35	6.90	3.08
Physician	5	0	0	0	0	1	1	2	1	117.00	5.10	2.55
Social worker	5	0	1	0	1	1	2	0	0	107.00	7.45	3.73

TABLE XI

SIGNIFICANCE BETWEEN THE MEANS OF PAIRS OF EIGHT
OCCUPATIONS CHOSEN BY THE GIRLS

Occupations	No.	Mean	Stenographer	Nurse, R.N.	Teacher	Clerk, Typist	Nurse, B.Sc.	X-ray Tech.	Physician	Social Worker
1. Stenographer	46	104.33		N	N	.05	N	N	.01	N
2. Nurse, R.N.	37	101.97	N		N	N	N	N	.01	N
3. Teachers	15	108.35	N	N		.05	N	N	.05	N
4. Clerk, Typist	8	99.00	.05	N	.05		N	.05	.01	N
5. Nurse, B.Sc.	8	106.50	N	N	N	N		N	N	N
6. X-ray Tech.	6	107.35	N	N	N	.05	N		.05	N
7. Physician	5	117.00	.01	.01	.05	.01	N	.05		N
8. Social Worker	5	107.00	N	N	N	N	N	N	N	

It is unfortunate that there should be a significant difference between the mental abilities of students chosing occupations which require similar amounts of mental ability.

An example of this is found in the students selecting engineering and accountancy. The mean mental ability of persons in these occupations is in the top level and there is no significant difference between them. While the mean mental ability of students choosing to become engineers is significantly higher than the mean mental ability of students choosing to become accountants, it is still significantly lower than the mean of persons actually engaged in engineering. Only in the case of the students choosing to be electricians, is the mean mental ability in the same level as that of persons who are already electricians.

The mean mental ability of students choosing to be farmers is the only instance where the mean of the students selection is significantly higher than the mean of persons in the occupations chosen.

Not only are there great differences in the mental abilities of students selecting different occupations, but there are also great differences in the mental abilities of students selecting the same occupation. The range for each occupation is so great that it is very

unlikely that all would make a satisfactory vocational
adjustment. For example insofar as mental ability de-
termines success and happiness in engineering, it might
be said that the three students with mental abilities
on the top level who chose to be engineers made wise
occupational choices. It would be wise because an oc-
cupation in this level is most in line with their men-
tal ability. The mental ability of the great majority
of engineers is in the top level. Providing there are
other compensating factors, the choice of the four stu-
dents in the next lower level may be considered accep-
table. While it is possible that the students in the
third level could conceivably succees as engineers, the
appropriateness of their choice is very debatable. How-
ever the ten students who have chosen to become engineers
and are in and below the fourth level, would be wiser to
plan on entering an occupation requiring less mental
ability. This is briefly the method which is used in
the next chapter to evaluate the "goodness" of each
student's occupational choice.

CHAPTER VII

THE RELATIONSHIP BETWEEN THE OCCUPATIONAL LEVEL
CHOSEN AND THE MENTAL ABILITY OF THE STUDENT

This chapter contains most of the important
findings of the investigation. In it the students'
mental ability will be compared with the mean mental
ability of persons found in the occupation which the
student plans to enter and make his life work. The
view that the level of aspiration of students is too
high, and that there is little relationship between
the student's mental ability and the goals he sets
for himself will be tested. An effort will be made
to reveal any significant differences and relation-
ships which may exist.

The relationship between the mental ability
of the students and the mean mental ability of persons
in the occupations chosen by the students was calculated
from the Product-Moment Coefficient of Correlation charts
included in the appendix. The obtained coefficients are
presented along with their statistical significance in
the following table.

It can be seen that while the correlation coef-
ficients are not very large, they are statistically
significant. How "good" this relationship is, is hard

TABLE XII

CORRELATION COEFFICIENTS BETWEEN STUDENTS' MENTAL
ABILITY AND OCCUPATIONAL LEVEL CHOSEN

Group	Number	Correlation Coefficient (r)	Significance of r
All Students	311	.32	.01
Boys	135	.36	.01
Girls	176	.30	.01

to say. It does indicate that in general there is a
tendency for the students with greater amounts of men-
tal ability to select occupations which require more
mental ability than the selections of students with
less mental ability. Certainly it must be of some
importance when it is realized that the validity co-
efficients of some intelligence tests in use are not
much higher.

Fisher's Z function was used to see if the
apparent difference between the correlation coeffi-
cients of the boys and girls was significant. It was
found that this difference of .06 could occur in 55
percent of the cases due to sampling errors alone.

Therefore it may be concluded with confidence
that there is no real difference in the coefficients
of correlation.

The next consideration, though related to
the foregoing, deserves special attention. While
the students with relatively larger amounts of men-
tal ability may select occupations requiring more
mental ability, this does not say that the students
are making choices commensurate with their mental
ability. Perhaps the best way to see if the stu-
dents are making appropriate choices would be to
compare the mean mental ability of the students
with the mean mental ability of the occupations
which the students have chosen. From data presen-
ted for fourteen occupations in the last chapter it
was seen that there are great differences in the men-
tal abilities of students selecting the same, as well
as different occupations. Table XIII presents the
mental ability of all students and a distribution of
all occupations chosen according to the mean mental
ability of persons already in the occupation.

As would be expected, there are few students
choosing the lower level occupations even though more
students are in the lower mental ability levels than
in the higher levels. A mean test of significance
indicated that this difference of 8.08 in the means
could occur in less than one percent of the cases due
to sampling errors. Therefore it may be concluded

TABLE XIII

MENTAL ABILITY OF 311 GRADE XI STUDENTS AND MEAN
MENTAL ABILITY FOUND IN THE OCCUPATIONS CHOSEN BY
THESE STUDENTS

	Mental Ability Levels										
	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above	Mean	S.D.	S.E.(M)
Students	30	35	42	64	53	41	20	26	105.56	9.95	.57
Occupations Chosen	5	2	12	37	25	127	59	44	113.66	7.35	.42

with high confidence that the Grade XI students are
selecting occupations in which their mean mental
ability is much lower than the mean mental ability of
persons actually engaged in the occupations they have
chosen.

Similar data will be given for each sex sepa-
rately.

A mean test of significance indicates that
this difference in means of 7.00 could occur in less
than 1 percent of the cases due to sampling errors.
Therefore it may be concluded with high confidence
that the Grade XI boys are selecting occupations in
which their mean mental ability is much lower than
the mean mental ability of persons actually engaged
in the occupations the boys have chosen.

TABLE XIV

MENTAL ABILITY OF 135 GRADE XI BOYS AND MEAN MENTAL ABILITY FOUND
IN THE OCCUPATIONS CHOSEN BY THESE BOYS

	Mental Ability Levels								Mean	S.D.	S.E.(M)
	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above			
Boys	18	12	21	25	27	10	8	14	105.04	10.45	.90
Occupations Chosen	5	1	12	30	18	16	16	37	112.04	9.90	.85

TABLE XV

MENTAL ABILITY OF 176 GRADE XI GIRLS AND MEAN MENTAL ABILITY FOUND
IN THE OCCUPATIONS CHOSEN BY THESE GIRLS

	Mental Ability Levels								Mean	S.D.	S.E.(M)
	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above			
Girls	12	23	21	39	36	31	12	12	105.96	9.55	.75
Occupations Chosen	0	1	0	7	7	111	43	7	114.91	4.03	.30

A mean test of significance indicates that the difference in means in Table XV could occur in less than 1 percent of the cases due to sampling errors. Therefore it may be concluded with high confidence that the Grade XI girls are selecting occupations in which their mean mental ability is much lower than the mean mental ability of persons actually engaged in the occupations the girls have chosen.

Not only are there differences between the means of the students' mental ability and the means of the occupational levels chosen, but there seems to be differences in variability also. The following table summarizes the variability tests on the significance of the differences between the standard deviations of the students' mental ability and the mental ability of persons engaged in the occupations the students have chosen.

The reason for the significant difference between the variability of the girls' mental ability and the mental ability found in the occupations chosen can be seen in table XIX. There is a marked tendency for the majority of girls to select occupations in the third occupational level regardless of their mental ability.

While data already presented and discussed have established the fact that some students are making inappropriate choices, the degree and direction of the dis-

crepancy between the student's mental ability level
and the occupational level which the student plans to
enter, has not been considered. This will now be done
for each student. It has been obvious that many stu-
dents are selecting occupations for which they do not
have sufficient amount of mental ability. Though it
has not been so evident, some students choose occupa-
tions for which they have more mental ability than the
mean mental ability of workers in the occupation.

TABLE XVI

SIGNIFICANCE OF THE DIFFERENCE IN STANDARD DEVIATIONS FOUND
IN THE STUDENTS' ACTUAL MENTAL ABILITY AND IN THE MENTAL
ABILITY FOUND IN THE OCCUPATIONS CHOSEN BY THE STUDENTS

		Mental Ability of Students		Mental Ability found in Occu-pations Chosen		Difference in S.D.'s	Significance of Difference
		S.D.	S.E.	S.D.	S.E.		
Group	No.						
All Stu-dents	311	9.95	.40	7.35	.30	2.60	.01
Boys	135	10.45	.64	9.90	.60	.55	not significant
Girls	176	9.55	.53	4.03	.22	5.52	.01

The following three tables present the relation
between the mental ability level of the student and the
occupational level chosen. This will be done for each
sex separately as well as for all students together. In
each case the data will be summarized on one large table.

TABLE XVII

THE LEVEL OF OCCUPATION CHOSEN BY THE GRADE XI STUDENTS
AND RELATION TO THEIR MENTAL ABILITY

Students' Mental Ability	Distribution of occupational choices by mental ability required								Num-ber	Steps of variation from the mental ability level of the student											
	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above		-4	-3	-2	-1	0	1	2	3	4	5	6	7
122 & above				1	3	4	9	9	26	1	3	4	9	9							
117-121				2		5	4	9	20		2		5	4	9						
112-116		1	1	3	1	18	12	5	41	1	1	3	1	18	12	5					
107-111	1		2	8	3	25	5	9	53	1		2	8	3	25	5	9				
102-106	1		3	2	6	34	12	6	64		1		3	2	6	34	12	6			
97-101	2	1	1	7	4	14	9	4	42			2	1	1	7	4	14	9	4		
92-96			2	6	5	18	3	1	35						2	6	5	18	3	1	
91 & below	1		3	8	3	9	5	1	30					1		3	8	3	9	5	1
TOTALS	5	2	12	37	25	127	59	44	311	3	7	11	27	38	61	57	48	36	16	6	1

TABLE XVIII

THE LEVEL OF OCCUPATION CHOSEN BY THE GRADE XI BOYS
AND THE RELATION TO THEIR MENTAL ABILITY

Students' Mental Ability	Distribution of occupational choices by mental ability required								Num- ber	Steps of variation from the mental ability level of the student											
	91 & below	92- 96	97- 101	102- 106	107- 111	112- 116	117- 121	122 & above		-4	-3	-2	-1	0	1	2	3	4	5	6	7
122 & above				1	2	1	3	7	14	1	2	1	3	7							
117-121				1			1	6	8		1			1	6						
112-116		1	1	3		1		4	10	1	1	3		1		4					
107-111	1		2	7	2	6	1	8	27	1		2	7	2	6	1	8				
102-106	1		3	2	5	4	4	6	25		1		3	2	5	4	4	6			
97-101	2		1	4	4	2	4	4	21			2		1	4	4	2	4	4		
92- 96			2	5	2	1	1	1	12						2	5	2	1	1	1	
91 & below	1		3	7	3	1	2	1	18					1		3	7	3	1	2	1
TOTALS	5	1	12	30	18	16	16	37	135	3	5	8	13	15	23	21	23	14	6	3	1

TABLE XIX

THE LEVEL OF OCCUPATION CHOSEN BY THE GRADE XI GIRLS AND RELATION TO THEIR CHOSEN ABILITY

Distribution of occupational choices by mental ability required / Steps of variation from the mental ability level of the student

Students' Mental Ability	91 & below	92-96	97-101	102-106	107-111	112-116	117-121	122 & above	Number	-4	-3	-2	-1	0	1	2	3	4	5	6	7
122 & above					1	3	6	2	12		1	3	6	2							
117-121				1		5	3	3	12		1		5	3	3						
112-116					1	17	12	1	31				1	17	12	1					
107-111				1	1	19	4	1	26				1	1	19	4	1				
102-106					1	30	8		39						1	30	8				
97-101				1	3	12	5		21						1	3	12	5			
92-96		1		3		17	2		23					1		3		17	2		
91 & below				1		8	3		12								1		8	3	
TOTALS	0	1	0	7	7	111	43	7	176	0	2	3	14	23	38	36	25	22	10	3	0

A few of the many interesting things that can be gathered from the tables deserve special mention. It can be readily seen that while there is considerable variability in the occupational levels chosen by students in a particular mental ability level, there is in general, a progressive decrease with student mental ability in the level of occupation chosen. Bright students as a whole choose occupations which require relatively more mental ability than the duller students, an observation confirmed by the coefficient of correlation established earlier in the chapter. Approximately one-sixth of the students have chosen occupations which have a mean mental ability at least one level below their mental ability level. It is only rarely that students of low mental ability chose below their level. As may have been expected more than two-thirds of the students have chosen above their mental ability level.

The Chi-square test devised by Brandt and Snedecor for testing agreement between two observed distributions may be employed to determine whether there is any significant difference in the number and degree of disparities which exist between the choices of the girls and boys. The two end steps of the twelve steps of variation were combined to eliminate the minus four and plus seven steps which for the girls did not contain a number. The

resulting 10 category distributions permit the calcula-
tion of the Chi-Square value. The following table
presents these data. The calculations for obtaining
the Chi-Square are included in the appendix.

TABLE XX

CHI-SQUARE FOR TESTING AGREEMENT IN THE STEPS OF
VARIATION OF OCCUPATIONAL LEVEL CHOSEN FROM
THE STUDENTS' MENTAL ABILITY LEVEL
BETWEEN THE BOYS AND GIRLS

Category	a	b	c	d	e	f	g	h	i	j	Total
Boys	8	8	13	15	23	21	23	14	6	4	135
Girls	2	3	14	23	38	36	25	22	10	3	176
Total	10	11	27	38	61	57	48	36	16	7	311

With nine degrees of freedom the obtained Chi-
Square of 13.08 could occur in 17 percent of the cases
due to sampling errors alone. Therefore it may be
concluded with confidence that there is no significant
difference in the disparities in mental ability and oc-
cupational level chosen between the boys and girls.
That is, the boys and girls do not differ in the "good-
ness" of their occupational choices.

Also from the three preceding tables the ap-
propriateness or "goodness" of the students' occupa-
tional choices may be seen. While it would be desirable

for each student to select an occupational level which
has the same mental ability requirements as he possesses,
the presence of other compensating factors may justify
considering choices one level above and one level below
as good or acceptable choices. These students in this
group have, as far as mental ability is concerned, a
reasonable chance for success. It is of course possible
that some of the students who have chosen occupations
two levels above or below their mental ability level,
and are able to enter them, will make satisfactory vo-
cational adjustments, but as was mentioned in the pre-
vious chapter, the appropriateness of these choices
is very debatable in most cases. Students who have
chosen occupations three and more levels above and
below their mental ability level can quite safely be
said to have made poor choices with rare exceptions.

The following table presents a summary of the
appropriateness of the students' occupational choices
as defined above.

That there is no essential sex difference in
the "goodness" of occupational choices is also to be
seen in this table. What is much more important is
that approximately three-fifths of both sexes have
chosen occupations in which their mental ability is
significantly different from the mean mental ability
of persons actually engaged in this work.

TABLE XXI

THE APPROPRIATENESS OF THE STUDENTS'
OCCUPATIONAL CHOICES

Occupational Levels from Students Mental Ability Level	Total		Boys		Girls	
	No.	%	No.	%	No.	%
-1,0,-1(good choices)	126	40.5	51	37.8	75	42.6
-2,-2 (debatable)	68	21.9	29	21.5	39	22.2
-3,-4 (poor choices)	10	3.2	8	5.9	2	1.1
-3,-4, (poor choices) -5,-6,-7	107	34.4	47	34.8	60	34.1

CHAPTER VIII

SUMMARY OF CONCLUSIONS AND IMPLICATIONS

This study may be considered an attempt to evaluate the effectiveness of guidance practices in the Edmonton Public High Schools. A number of questions were presented in the first chapter and a method for obtaining the answers was outlined in the second. The last four chapters have been concerned with analyzing the Grade XI students' vocational decisions with special attention to the relation between the students' mental ability and the mean mental ability of persons actually engaged in the occupations chosen by the students.

CONCLUSIONS

The following summary constitutes the major findings of the investigation and includes answers to the questions referred to above. The findings are listed in the order disclosed in the preceding chapters.

1. Of the 537 Grade XI students involved in the study 311 or 58 percent indicated that they had made an occupational choice. Only 47.37 percent of the boys compared to 69.84 percent of the girls had choices.

2.   While 94 percent of the boys without choices planned
to complete Grade XII, only 80 percent with choices ex-
pected to complete Grade XII before leaving high school.
This difference of 14 percent is significant at the .01
level.   The respective percentages for the girls are 83
and 84.2

3.   A total of 42 students without occupational choices
indicated that they had not been thinking about making
a choice.

4.   Twenty-one students expecting to complete Grade XI
only, had not made an occupational choice.

5.   The 537 students chose 78 different occupations.
The boys chose 53 and the girls 34.

6.   More than one-third (34.8%) of the students expected
to become engaged in occupations which normally require
university education for entrance.

7.   The mean mental ability of boys with and without
occupational choices is 105.04 and 108.50 respectively.
This difference of 2.87 is significant at the .01 level.
No such difference was found in the girls.

8.   Students choosing some occupations differed signifi-
cantly in mental ability from others chosing occupations
which required similar amounts of mental ability.

9.   On the other hand in some cases where significant
differences between the mean mental abilities of stu-
dents selecting various occupations could be expected,

they were not found.

10. There were great differences in the mental abilities of students selecting the same occupation. The range was so great that it is very unlikely that all will make satisfactory vocational adjustments.

11. The correlation coefficients between mental ability and occupational level chosen is .36 for the boys and .30 for the girls. Both correlation coefficients are significant at the .01 level. The difference of .06 is not statistically significant.

12. The mean mental ability of the 311 students was 105.56 and the mean mental ability of persons found in the occupations chosen by these students was 113.66. This difference of 8.08 is significant at the .01 level.

13. The standard deviation in the mental ability of the 176 girls was 9.55 and the standard deviation in the mental ability found in the occupations chosen by the girls was 4.03. This difference is significant at the .01 level. There was no such difference for the boys.

14. Approximately one-sixth of the students chose occupations one or more levels below their mental ability level, and approximately five-sevenths chose above their level.

15. It is only rarely that students of low mental ability chose occupations having a mean mental ability lower than the mental ability which they possessed.

16. A Chi-Square test of significance indicated that boys and girls do not differ in the "goodness" of their occupational choices.

17. Approximately three-fifths of both sexes chose occupations in which their mental ability significantly differed from the mean mental ability of persons actually engaged in this work.

IMPLICATIONS

The results of this investigation confirm the popularly-held belief that students are not very realistic and that their level of aspiration is too high. From the conclusions it would appear that either the students are not receiving vocational guidance or that they are refusing to accept it. In either case, something might well be done. Demands for an immediate, rapid development of the guidance program seem justified. The findings of this investigation emphasize the necessity for the schools to provide more guidance for all students so that they will have an opportunity to assess their strengths and weaknesses, make a realistic appraisal of themselves, and choose an occupational goal in line with their mental ability.

APPENDIX

Illustrating the Calculation
of Typical Problems

The following formula used to determine the significance of the difference between two uncorrelated percentages was taken from Garrett's book "Statistics in Psychology and Education" [1]

$$\sigma_{D\%} = 100\sqrt{\frac{P_1 q_1}{N_1} + \frac{P_2 q_2}{N_2}}$$

where p = the proportion of times the given event occurs:

q = 1 - p; and N = the number of cases.

This formula will now be applied to the percentages of Grade XI girls and boys in Edmonton who have indicated an occupational choice.

$$\sigma_{D\%} = 100\sqrt{\frac{(.698)(.302)}{252} + \frac{(.474)(.526)}{285}}$$

$$\sigma_{D\%} = 100\sqrt{\frac{.211}{252} + \frac{.250}{285}}$$

$$\sigma_{D\%} = 100\sqrt{.836 + .875} = 4.14\%$$

The difference between the percentages of those with choices in the boys and girls is 69.84 - 47.37 or 22.47.

The critical ratio is $\left(\frac{D}{\sigma D}\right)$ $\frac{22.47}{4.14}$ = 5.45

This critical ratio of 5.45 is significant at the .01 level.

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[1] Garrett, H.E., "Statistics in Psychology and Education", Long mans Green and Co. New York, 1947. p. 219.

The significance of the difference between the mean mental ability of students with and without occupational choices was determined from the following formula.[1]

$$\sigma_D \text{ or } \sigma_{M_1} - M_2 = \sqrt{\sigma^2_{M_1} + \sigma^2_{M_2}}$$

Where σ_{M_1} is the standard error $\left(\dfrac{\sigma_1}{\sqrt{N_1}}\right)$ of the mean mental ability of the students having an occupational choice; σ_{M_2} is the standard error $\left(\dfrac{\sigma_2}{\sqrt{N_2}}\right)$ of the mean mental ability of students not having an occupational choice; and σ_D is the standard error of the difference between the two means.

Substituting data from Table III in this formula we have

$$\sigma_D = \sqrt{\left(\frac{9.95}{\sqrt{311}}\right)^2 + \left(\frac{10.21}{\sqrt{225}}\right)^2}$$

$$= \sqrt{(.57)^2 + (.68)^2}$$

$$= \sqrt{.26 + .46}$$

$$= \sqrt{.72}$$

$$\sigma_D = .85$$

The difference between the mean mental ability of students without occupational choices and the mean of students with occupational choices is 108.43 - 105.56 or 2.87.

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[1] Ibid. p. 198.

The critical ratio is $\left(\dfrac{D}{\sigma_D}\right)$ $\dfrac{2.87}{.85}$ = 3.25

This critical ratio of 3.25 is significant at the .01 level.

The following formula was used to obtain the standard error of the difference between the uncorrelated standard deviations found in the mental abilities of students with and without occupational choices.

$$\sigma_{D_\sigma} \text{ or } \sigma_{\overline{\sigma_1}} - \sigma_{\overline{\sigma_2}} = \sqrt{\sigma_{\overline{\sigma_1}}^2 + \sigma_{\overline{\sigma_2}}^2}$$

where $\sigma_{\overline{\sigma_1}} = \dfrac{\sigma_1}{\sqrt{2N}}$ and $\sigma_{\overline{\sigma_2}} = \dfrac{\sigma_2}{\sqrt{2N}}$

applying this formula to the data from table III we have

$$\sigma_{D_\sigma} = \sqrt{\left(\dfrac{9.95}{\sqrt{2 \times .311}}\right)^2 + \left(\dfrac{10.21}{\sqrt{2 \times 226}}\right)^2}$$

$$= \sqrt{(.40)^2 + (.48)^2}$$

$$= \sqrt{.16 + .23}$$

$$= \sqrt{.39}$$

$$\sigma_{D_\sigma} = .62$$

The difference in standard deviation is 10.21 - 9.95 or .26.

The critical ratio is $\left(\dfrac{D}{\sigma_{D_\sigma}}\right)$ $\dfrac{.26}{.62}$ = .44

A critical ratio of .44 could occur in 66 percent of the cases due to sampling errors alone and therefore

the difference of .26 in standard deviations is not significant.

In table VII it was indicated that there was no significant difference between the mean mental ability of 47 students choosing to be stenographers and the mean mental ability of 37 students choosing to be registered nurses.

The following procedure will illustrate how this conclusion was reached.

The mean of students choosing to be stenographers is 104.33 and the standard deviation is 9.00. The standard error of the mean was computed from the following formula.[1]

$$\sigma_{M_1} = \frac{\sigma_1}{\sqrt{N-1}}$$

substituting $\sigma_{M_1} = \frac{9.00}{\sqrt{46-1}} = \frac{9.00}{\sqrt{45}} = \frac{9.00}{6.71}$

$$\sigma_{M_1} = 1.34$$

The mean of students choosing to be registered nurses is 101.97 and the standard deviation is 7.85

$$\sigma_{M_2} = \frac{7.85}{\sqrt{37-1}} = \frac{7.85}{\sqrt{36}} = \frac{7.85}{6}$$

$$\sigma_{M_2} = 1.31$$

The standard error of the difference between the

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[1] Ibid. p. 189.

two uncorrelated means[1] is

$$\sigma_D = \sqrt{(\sigma_{M_1})^2 + (\sigma_{M_2})^2}$$

that is $\sigma_D = \sqrt{(1.34)^2 + (1.31)^2}$

$$\sigma_D = 1.88$$

The difference in means is 104.33-101-97 or

2.36. The critical ratio is $\frac{2.36}{1.88} = 1.26.$

A critical ratio of this size could occur in 21% of the
cases due to sampling errors alone. Therefore there is
no significant difference in the mean mental ability
of girls choosing to become stenographers and registered
nurses.

This is the method that was used to establish
the significance of the difference between the mean
mental ability of students choosing the 14 most popular
occupations.

The correlation coefficients presented in table
XII were calculated by the product moment method.

From data on the following page the correlation
between the students' mental ability and the mean mental
ability of persons already in the occupation chosen by
the student may be obtained.

Formula 44 in Garrett was used.[2]

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[1] Ibid. p. 198.
[2] Ibid. p. 287.

CALCULATION OF THE PRODUCT-MOMENT COEFFICIENT OF CORRELATION BETWEEN THE MENTAL ABILITY OF ALL GRADE XI STUDENTS AND THE MEAN MENTAL ABILITY FOUND IN PERSONS ACTUALLY IN THE OCCUPATIONS CHOSEN BY THE STUDENTS

M.A. Level	91 & below	92-96	97-101	102-107	107-112	112-117	117-122	122 & above	fy	y^1	fy^1	fy^{1^2}	Ex^1	Ex^1y^1
122 & above			0	1	3	4	9	9	26	4	104	416	22	88
117-121				2		5	4	9	20	3	60	180	18	54
112-116		1	1	2	2	18	12	5	41	2	82	164	8	16
107-111	1		2	5	6	25	5	9	53	1	53	53	-7	-7
102-106	1		3	7	1	34	12	6	64	0	0	0	0	0
97-101	2	1	1	7	4	14	9	4	42	-1	-42	42	-18	18
92-96			2	8	3	18	3	1	35	-2	-70	140	-18	36
91 & below	1		3	5	6	9	5	1	30	-3	-90	270	-26	78
fx	5	2	12	37	25	127	59	44	311		97	1265	-21	283
x^1	-5	-4	-3	-2	-1	0	1	2						
fx^1	-25	-8	-36	-74	-25	0	59	88	-21					
fx^{1^2}	125	32	108	148	25	0	59	176	673					
fy^1	-4	1	-10	-19	-6	15	47	73	97					
Ex^1y^1	20	-4	30	38	6	0	47	146	283					

$$r = \frac{\frac{\Sigma x^1 y^1}{N} - C_x C_y}{\sigma_x \sigma_y}$$

$N = 311$ $\Sigma x^1 y^1 = 283$

$Cy = \frac{97}{311} = .312$ $Cx = \frac{-21}{311} = -.068$

$Cy^2 = .097$ $Cx^2 = .005$

$\sigma_y = \sqrt{\frac{1265}{311} - .097}$ $\sigma_x = \sqrt{\frac{673}{311} - .005}$

$\sigma_y = 1.96$ $\sigma_x = 1.47$

Applying the formula to the data the correlation coefficient may be calculated thus:

$$r = \frac{\frac{283}{311} - (.312)(-.068)}{1.99(1.47)}$$

$$r = .32$$

Table 49 in Garrett[1] shows a correlation coefficient of .32 for a sample of .311 to be significant at the .01 level.

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The following formula was used to determine the significance of the difference between the correlation coefficients of .36 and .30

$$\text{Critical Ratio} = \frac{Z_1 - Z_2}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}}$$

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[1] Ibid. p.299.

The r_1 = .36 becomes Z_1 = .38

and r_2 = .30 becomes Z_2 = .31

N_1 = 135 and N_2 = 176

Substituting we have

$$\text{Critical Ratio} = \frac{.38 - .31}{\sqrt{\frac{1}{135-3} + \frac{1}{176-3}}}$$

$$= \frac{.07}{\sqrt{.00758 + .00578}}$$

$$= .61$$

A critical ratio of this size could occur in 55 percent of the cases due to sampling errors alone therefore it may be concluded with confidence that there is no significant difference in the coefficients of correlation.

Following table XIII it was pointed out that there was a significant difference between the mean mental ability of the students and the mean mental ability of persons engaged in the occupations chosen by the students.

The standard error of the difference between the correlated means was calculated from formula 33 in Garrett.[1]

$$\sigma_D = \sqrt{\sigma_{M_1}^2 + \sigma_{M_2}^2 - 2r_{12}\sigma_{M_1}\sigma_{M_2}}$$

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[1] Ibid. p. 209.

substituting

$$\sigma_D = \sqrt{(.57)^2 + (.42) - 2(.32)(.57)(.42)}$$

$$\sigma_D -= .59$$

The difference in means is 113.64-105.56 or 8.08

The critical Ratio is $\dfrac{8.08}{.59} = 13.7$

This is highly significant at the .01 level

The Brandt-Snedecor method of calculating the Chi-Square regerred to in table XX was followed.

The formula for obtaining the Chi-Square is

$$\chi^2 = \frac{1}{\overline{p}\,\overline{q}} \left(\frac{\sum ai^2}{ci} - \frac{A^2}{N} \right)^2$$

Applying this formula to the data in Table XX we have

$$\chi^2 = \frac{1}{\left(\frac{135}{311}\right)\left(\frac{176}{311}\right)} \left(\frac{(8)^2}{10} + \frac{(8)^2}{11} + \frac{(13)^2}{27} + \frac{(15)^2}{38} + \frac{(23)^2}{61} + \frac{(21)^2}{57} \right.$$

$$\left. + \frac{(23)^2}{57} + \frac{(23)^2}{46} + \frac{(14)^2}{36} + \frac{(6)^2}{16} + \frac{(4)^2}{7} + \frac{135^2}{311} \right)$$

$$\chi^2 = \frac{1}{.246} \left(6.4 + 5.82 + 6.26 + 5.92 + 8.67 + 7.74 + \right.$$

$$\left. 11.02 + 5.44 + 2.25 + 2.29 + 58.60 \right)$$

$$\chi^2 = 13.08$$

From table 23 in Garrett[1] we find that a χ^2 of this size could occur in 17 percent of the cases due to accidents of sampling alone.   Therefore it may be concluded with confidence that there is no significant difference between the two distributions.

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[1]
    Ibid.   p. 242.